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Modelling Management of Chronic Illness in Everyday Life: A Common-Sense Approach

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Abstract

The Commonsense Model of Self-Regulation (CSM) has a history of over 50 years as a theoretical framework that explicates the processes by which individuals form cognitive, affective, and behavioral representations of health threats. This article summarizes the major components of individuals' "commonsense models", the underlying assumptions of the CSM as a theory of dynamic behavior change, and the major empirical evidence that have developed these aspects of the CSM since its inception. We also discuss ongoing changes to the theory itself as well as its use in medical practice for optimizing patients' self-management of chronic health threats. The final section focuses on future directions for the theory and its application.

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It is our pleasure to up-date this journal's readers on recent developments of the Common-Sense Model (CSM) and its contribution to our understanding of how people manage chronic conditions in everyday life. The CSM explicates the perceptual, behavioral, and cognitive processes involved in the creation of individuals' representations of the somatic and functional properties of the Self, the properties of illnesses, and the treatment required to manage illnesses, including formation of action plans for carrying out the treatment. We first outline the CSM's underlying properties, followed by a brief overview of its history, with selected examples of studies that drove it forward. The concluding section addresses directions for future research.

Underlying Properties and Assumptions of the CSM

The CSM Consists of Five Core Constructs

Five sets of variables comprise illness representations that are *perceptions* activated in response to somatic and functional changes. These perceptual domains include: 1) *identity* (pattern, location and severity of somatic sensations/symptoms and their possible meaning or label), 2) *timeline* (rate of illness onset; perception of illness duration and rates of decline), 3) *consequences* (functional, social, and financial) due to the illness and/or treatment, 4) *cause* (e.g., exertion; ate tainted food), and 5) *control* (e.g., home remedy stopped pain; nothing worked and went to the doctor). A similar set defines the representations of possible treatments and/or self-management steps ("treatment representations"): 1) *identity* (label, associated effects, experience when used), 2) *timeline* (duration of treatment; expectations for time required until treatment benefits are observed), 3) *consequences* (e.g., pain post-surgery, side effects), 4) *control* (e.g., surgery removed tumor; antacid stopped pain; how far treatment goes towards complete symptom/condition management), and 5) *cause* (underlying mechanism/link to illness; e.g., antibiotic applied to wound kills germs).

CSM Constructs are Concrete and Abstract

It is important to note that the variables in each of the five sets (identity to perceived cause) are both physically experienced (pain is felt; cuts and bruises are felt and seen) and mentally conceptualized (e.g., the belief that pain indicates biological disease/disorder and that biological disease/disorder causes pain). Thus, both concrete experience and abstract reasoning create illness and treatment representations – for example, the seen and painful, bleeding red area is understood as a cut or abrasion from a fall; the lump is conceived of as a cancer; the chest pain a heart attack. The problem, of course, is that the conceptualization may be incorrect – that is, the lump may not be a cancer – and the criterion used for evaluation of control (e.g., removal of pain) may not be a valid indicator of control of the underlying condition. In other words, the experiential features and concepts may or may not be in agreement with biological reality. Concrete and abstract levels are also involved in the multi-level representations of the Self and representations active at a given moment, e.g., self, illness or injury, and the representations of possible treatments, create expectations and the choice of a specific action for management.

Representation Formation is "Bayesian"

Bayesian probability modeling involves updating the likelihood (probability estimate) of occurrence or presence of an event given new, relevant information.

The analogous process in CSM is the updating of the representation of a somatic or functional change, its perceived identity and how it is labelled, and the expectations regarding its consequences, control, time frame or duration, and possible causes and perception as a threat and fear provoking. The representations are shaped by prior history, the prototypes acquired from past experience with own illnesses and injuries, observations of illness in others, and exposure to media and cultural beliefs about illness. Thus, an individual's interpretation of a new symptom can reflect his/her prior experience with that symptom (Teel, Meek, McNamara, & Watson, 1997), observations of the experiences of others, particularly family members, and information from media or other sources of health information (abstract levels of information rather than from concrete experiences).

Representations are "Multi-Level"

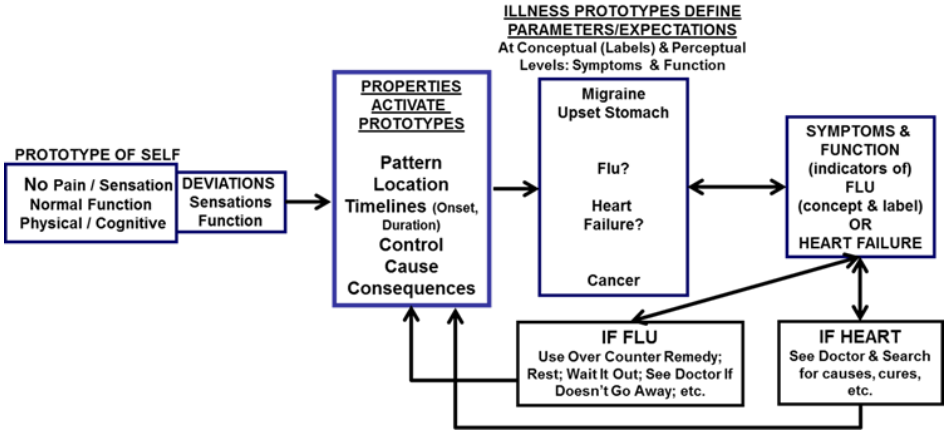
A representation can be initiated by a verbal cue, e.g., a medical diagnosis of cardiac disease or cancer, or a concrete cue, such as a lump or pain. Thus the process generating the representation and its content is multi-level; perceived and felt, and abstract or conceptual. The content defining the representation is a product of the individual's prior somatic experience, environmental exposures or behavioral antecedents, observations of others in similar situations and exposures to media as well as a variety of cultural inputs. The representation will also activate plans for action and anticipations for specific outcomes. The linkage of an active representation to the past and anticipated future, can proceed consciously and/or automatically (largely non-conscious); for example, when the somatic system notices a change in functioning below conscious awareness, the individual may be triggered to think of previously experienced illnesses without having to consciously work out the linkages between the current symptom, past illnesses, and likely future progression of illness.

Representations Come From Prototypes of Self, Illness, and Treatment/Action

Representations are activated when cues from one's own physical system or observations of others, interact with *prototypes*. CSM represents somatic or functional cues from one's own physical system as deviations from the prototypes of the Self, a prototype that is a product of an individual's prior experience and biological structure. Similarly, prototypes of specific illnesses, treatments and self-management strategies or action plans, are repositories of personal experience with specific illnesses (symptoms and diagnosed or labelled), observations of illnesses and management by others, and media-based messages. As repositories of history, prototypes are the source of the base rates and expectations in the five content areas of illness and treatment representation. For example, if a previously symptom-free individual experiences an abrupt onset of severe chest pain, the quality, location, duration and disruption of ongoing activity in conjunction with perceived,

antecedent causes generates active mental representations of a current condition – for example, "I'm having a heart attack", food poisoning, etc. The activation process is depicted in Figure 1.

Figure 1. *Matching Deviations from Self to Illness Prototypes*



Note. Prototypes are averages of a history of experiences with SELF and specific illnesses. Prototype for FLU and prototype for HEART FAILURE can share expected pattern and location of some symptoms (obstructed breathing; fatigue), though they differ markedly in Time Lines, control and outcomes. The process is computational as each prototype assigns different weights to each deviation. Repetition forms modules (stomach problem; migraine; etc.) that generate higher order, declarative structure, e.g., ACUTE and CHRONIC models. As the number of conditions increase with age and properties fit two or more prototypes there is increasing uncertainty in the construction of representations. Representations based on histories of repeated construction are activated rapidly and can interfere with the construction of new, biologically valid representations, a problem with many chronic, asymptomatic conditions onset in the later years of life.

Theoretical and Empirical Development of the Common Sense Model (CSM)

Early Antecedents: Perception of Health Threat and Action Plans

The CSM was developed iteratively and has had several different names in its history. Early evidence highlighted the importance of personal and loved-ones' experiences and action plans for predicting engagement in a target behavior. A study examining community responses to the 1957 flu pandemic was the first in a series from which CSM evolved (Rosenstock, Hochbaum, & Leventhal, 1960). The data showed that participants who experienced symptoms or saw family members or a close friend fall ill, were more likely to believe they were at risk, that flu was severe, and to take action (e.g., to call the doctor; speak to a pharmacist; get a flu shot). Thus, concrete experience led to abstract ideas or health beliefs regarding flu vaccination and an array of actions (Leventhal, Hochbaum, & Rosenstock, 1960).

A series of studies examining the effects of fear-arousing communications on preventive health behaviors identified a central component of the model: "action plans" (see Leventhal, 1970). The importance of detailed planning for action was clear from the data showing that both a highly threatening, as well as a mild, or low threatening fear message about the dangers of contracting tetanus, were equally likely to lead to action if the fear messages were followed by a concrete, action plan – a map showing the location of a health clinic and examples as to when one would pass the tetanus-shot clinic during daily class changes (Leventhal, Singer, & Jones, 1965). Although the highly fearful message generated a significant level of intention to act, neither it nor the milder message were antecedents to action in the absence of an action plan. Action plans alone, however, were insufficient for action; both threat message and an action plan were essential antecedents to action.

The above studies, and others, set the stage for the Self-Regulation-Model (the earlier version of CSM) in two important ways. First, the studies emphasized the importance of experience, perception and concrete behavioral plans, for health relevant action. Second, they made it clear that three sets of factors were important for action: a sense of an existent threat, the availability of a method of control or coping, and a plan for action. Fear seemed to function by enhancing attitudes favorable to the health message and generating intentions to act, but fear and its associated beliefs and intentions, faded over time. The representation of the threat, the behavior for control, and the plan stayed in mind. Missing from the Self-Regulation Model, however, was the content and structure of the threat; i.e., how were the threat of tetanus, of smoking, of the flu epidemic, represented? We did not know.

Content and Structure of Illness Representations

Studies of seeking care for acute conditions and longer term management of chronic illnesses identified the five sets of variables that make the representations of an illness and its treatments, and examined how these representations are activated and when and how they generate action plans and action.

Responding to short term health threats: An acute model. There is an abundance of evidence for the following, simple hypothesis: deviations from the normal self, that is symptoms and other physical and cognitive dysfunctions, motivate care seeking (Stoller, Pollow, & Forster, 1994). Whether a deviation leads to care seeking depends, however, on the content of the five domains of an illness representation: the associated symptoms of the health threat, its severity, and possible applied labels (*identity*), its rate of onset and duration (*timeline*), its response to self-management (*control*), its *consequences* (e.g., disruption of daily activities), and its perceived determinants (*causes*). Individuals' perceptions of each of these variables motivate seeking care. These effects were documented in detail in a year-long study comparing 111 individuals who sought medical care to 111

control participants, who were selected from a larger sample to match the care seekers in gender, age and family size but who did not seek care in the study time period (Cameron, Leventhal, & Leventhal, 1995). Symptoms were clearly an antecedent to care seeking, because all 111 care seekers reported symptoms, whereas only 33 of the matched controls reported symptoms. Further comparisons of the 111 care seekers to the 33 symptomatic, non-care seeking controls showed differences in their perceived timelines (care seekers' symptoms had been present for approximately 10 days, controls' for less than 6 days) and identity (68% of care seekers labeled their symptoms vs 46% of symptomatic control participants). The 33 control patients also regarded their symptoms as less disruptive (1.39 vs 3.27 out of 5), and they were far less likely to be advised to seek care after communicating to someone (9% vs 50% for the care seekers). There is little reason to doubt that symptom onset is critical for care seeking when onset is amplified as illustrated by the Cameron et al. (1995) data. Care seeking is provoked when the experience of an illness appears to exceed the parameters of a general *acute* model (symptoms vanish in a brief time, are unimportant and not disruptive of daily life). This general, acute model, appears to underlie the care seeking of many of the patients in Cameron et al. study (1995).

Responding to long term health threats: A chronic model. Chronic, mostly life-long conditions, are often asymptomatic, their duration and silent development creating a far different framework for management than that specified by the *acute* model, which fits with individuals' prior, prototypical experiences of common acute illnesses, such as the common cold or the flu. An abundance of data across multiple conditions verifies the consequences of inconsistencies between an acute framework (the expectation that all illnesses are symptomatic and short lived) and a chronic reality (the asymptomatic progression and life-long timeline of many chronic health threats). Hypertension, asthma, congestive heart failure and diabetes are prime examples of this inconsistency and are also four of the five most prevalent conditions (depression the 5th) that drive health care spending in the United States (Halverson, 2007; WHO, 2009). Non-adherence to treatment is the primary outcome of the inconsistency between the acute and chronic models for self-management. A rapid tour of the supporting data makes vivid the truth of a statement attributed to C. Everett Koop, former Surgeon General of the United States: "Drugs don't work in patients who don't take them!"…and patients won't take drugs unless they perceive a need to do so, even when asymptomatic (DiMatteo, Giordani, Lepper, & Croghan, 2002; Haynes, Ackloo, Sahota, McDonald, & Yao, 2008).

Hypertension. Our early study of patients with hypertension examined the content and operation of an acute, symptomatic model of hypertension and its ramifications for health behavior, in 165 patients (Meyer, Leventhal, & Gutmann, 1985). Virtually all (80%) agreed with the statement that, "People can't tell whether

their blood pressure is up". They also believed however, that they could "tell when my own blood pressure is up" (92%). These patients reported a commonsense array of blood pressure symptoms (e.g., headache; dizziness; warm face; etc.) and reported that their blood pressure was in control if they perceived that the treatment impacted their symptoms (which is medically inaccurate)! Belief in an acute model (that one had hypertension only when experiencing symptoms, typical of acute conditions) was associated with discontinuation of treatment.

Asthma. The acute model is also at work for patients with asthma. Of 198 patients with asthma, 92% believed that they would always have asthma (definitely, probably, or possibly), but at the same time, 53% believed that they had it only when symptomatic – that is, they believed that they did not have asthma when they were not experiencing symptoms (Halm, Mora, & Leventhal, 2006). In short, a majority thought they had asthma for a lifetime but not all of the time. Patients holding to an acute model, i.e. have asthma only when symptomatic, are less likely to use a peak flow meter or make and keep routine visits for asthma when asymptomatic (see also Kaptein et al., 2008).

Heart failure and myocardial infarction (MI). The widely held common-sense prototypical symptoms for heart attacks, or myocardial infarction (MI), include chest and/or shoulder pain, profuse sweating, and shortness of breath. The symptoms are recognized as cardiac-related by both laypersons and practitioners. While these "classic" symptoms are the most common, at least for men, a significant number of individuals with MI will present with "atypical" symptoms, and this is more likely with increasing age (Canto et al., 2000). If symptoms are atypical, particularly if located in a part of the body not associated with heart function, then forming identity beliefs of symptoms indicating an MI is less likely (e.g., if pain is perceived to be in the upper abdomen rather than chest, it can be interpreted as gastric distress, a "stomach" or gut problem and not a heart problem). Bunde and Martin (2006) have shown that such common-sense views of symptoms affect the behavior of individuals experiencing an MI; delay in getting to a hospital is less common if they have a prior cardiac history, and report having experienced classic symptoms of chest pain, profuse sweating and shoulder pain. They are likely to delay care-seeking if they perceived that pain had a gastric cause, and if they experienced fatigue and sleep disturbances. Common-sense misidentification of symptoms also occurs for patients with heart failure. Breathlessness, chronic fatigue and swollen feet are signs of heart failure for a physician, but more likely interpreted as signs of aging to an elderly layperson; after all, one's heart is not in one's feet. Patients articulate these misperceptions: "When you hear about having heart problems ... you're supposed to feel maybe a pain in your left arm, maybe a pain in your chest, or pressure … It would have been clearer to me if I had chest pain and then I would have said, okay, I'll call and say I'm having chest pain ..." (Horowitz, Rein, & Leventhal, 2004). Patients fail to act when the somatic pattern

fails to map onto the prototype pattern of symptoms for heart disease. If it's nothing more than the usual acute event, e.g., a stomach ache, fatigue or "I didn't feel that great", even a dramatic event will fail to elicit care seeking. As one patient with heart failure said; "I guess that I could have gone to the doctor after I had that collapse on the hallway floor. It might have been a good idea."

Content and Structure of Treatment Representations

Although deviations from the normative self (symptoms; physical or cognitive dysfunction) establish a target for action, the treatment prototype elicited by the target is critical for response selection; for example, a severe or long lasting symptom leads to a doctor visit and sudden chest pain leads to rapid care seeking because of the perceived severity of the threats that have those characteristics. Conversely, fatigue and swollen legs in an elder may be tolerated and lived with as prototypical signs of aging. Less dramatic and more frequent everyday experiences are consistent with the pattern for acute, self-manageable conditions; it is common-sense to take an aspirin or acetaminophen for a stress headache and to rest if one is tired. Response selection and the action plan for implementation are consistent with expectations based upon the prototype underlying the experienced dysfunction and with the prototype of the action selected to ameliorate the deviation. Awareness of the prototype for action can be overlooked, as many actions are highly automatic (see, e.g., priming literature; Henderson, Hagger, & Orbell, 2007). Treatment prototypes can, however, become highly conscious and engage extensive deliberation when motivated by a deviation interpreted as highly threatening and fear arousing, such as calling for medical care if target symptoms indicate a heart attack, or cancers that pose serious threats to function and life. As is the case with illness prototypes, prototypes and the active representations of a treatment may address only part or completely misrepresent the underlying bio-physical properties of the threat (e.g., avoiding stressful situations to manage hypertension as stress reduction minimizes stress symptoms). Assessing treatment prototypes and how they are created and automated, are critical topics for research. Additional questions concerning how practitioners, family members and peers influence the creation of prototypes and encourage consistent use of specific procedures for managing illness threats, are open for intensive study. As the CSM is a complex system describing responses to management for many conditions, one must begin to address how it affects action at a given moment and how it impacts illness outcomes given the possibilities that it can be consistent and/or inconsistent with the biological processes involved in a condition at that point in time.

Given that people hold a vast array of common sense ideas regarding the role of medical treatments (foods, physical activity, relaxation, and social stresses) as possible causes and means of controlling illnesses, relatively few have been studied in detail; medication beliefs is an exception. Horne and colleagues (Horne et al., 2013) developed scales to assess patients' beliefs that medications are necessary for

one's health (specific to a chronic condition and prescribed medication) and their concerns that the medications may be harmful. A meta-analysis of 94 of the 223 publications that met criteria (adults; valid scale to assess adherence; etc.) showed that the Specific Necessity Beliefs scores were positively and consistently related to adherence, and Specific Concerns scores were consistently and negatively related to adherence. There is also a General Beliefs about Medicines subscale that assesses general beliefs about the necessity of medication versus alternative treatments for conditions (Horne, Weinman, & Hankins, 1999). The moderate and consistent relationship of these items to reported adherence is evidence for the importance of treatment prototypes, and the need to address both treatment and illness prototypes in clinical settings, and when designing communications to increase adherence for testing in randomized clinical trials.

Action Panning for Effective Self-Management

The concepts and data supporting the CSM address a key question raised by the studies on fear communications; "What are the cognitive factors or representations that combine with plans to generate action?" The question arose because fear messages increased intentions to take preventive actions but did not actually lead to action. We now know that the representations of the health threat and the treatment, not the fear per se, were the factors that combined with action plans to generate action (Leventhal, 1970; Tannenbaum et al., 2015a). Although the common-sense processes are necessary for action, it was clear that an action plan, in addition to the representations of illness and treatment, was essential for actuating behavior. Our better understanding of illness and treatment representations does not answer an important second question; "How do people generate action plans on their own?"

Precisely what is meant by "generating action plans on one's own?" In the early studies of fear communication, action planning was stimulated by the experimenters. The undergraduate subjects were given a map of their campus with the student health center circled. They were then provided with examples of class changes that went past the health center and encouraged to review their own schedules to identify the same patterns; this latter request (to review their schedules) was the main component requiring active involvement (Leventhal et al., 1965). The question is whether people engage in planning on their own, and if so, what initiates it and how do they do it? Do they scan their environments, their activities, etc., and detect places to introduce recommended health actions? Finally, do the specifics of planning lead to the formation of consistent, i.e., habitual actions?

Insights into how patients generate plans and develop consistent procedures or habits for managing health threats emerged from three recent sets of studies: 1) Longitudinal and experimental trials examining the effects of specific types or

components of communication on adherence; 2) Qualitative studies examining how individuals manage consistent performance; 3) Quantitative studies predicting how the factors identified in communication and qualitative studies effected consistent adherence, including the formation and value added of consistent, habitual action.

Clarifying illness and treatment prototypes and initiating action-planning. Can clinicians encourage and improve effective self-management of chronic conditions by clarifying the nature and treatment of the presenting problem – that is by clarifying illness and treatment prototypes and action-plans? This is not merely a practical or practice question; it is a challenge to experimental ingenuity, the methods and tools basic to all science. Although descriptive studies lack the statistical elegance of the randomized trial, they provide important clues respecting the content of clinical communications and patients' perceptions of a clinicians' style that do or do not encourage treatment adherence. Phillips, Leventhal, and Leventhal (2012) initiated a longitudinal study that provided a detailed examination of the effects of these factors by asking clinic patients to complete a questionnaire the day following a clinic visit. The questions assessed whether patients perceived their prior encounter as psychosocial (e.g., "My doctor understood my feelings about this problem"), or common-sense related (e.g., "The doctor told me how to monitor my problem to see if the treatment is working.") Patients were called and queried about the resolution of the problem a month later. Those patients checking high scores on the common-sense items were more adherent, and high scores on both adherence and the common-sense items (a direct path) were related to problem resolution. Although patients giving practitioners high praise on psychosocial skills were much more likely to be satisfied a month later, satisfaction was negatively related to improvement of the problem and psychosocial skills had no relationship to reported improvement in the condition that led to care seeking. The study illustrates the importance of providing more than a general instruction for treatment; practitioners who spell out the details of when and how to do a treatment, and what to expect during and after doing it, were effective communicators. How one defines a problem sets the stage for the choice and appropriate evaluation of treatment efficacy (Omer, Hwang, Esserman, Howe, & Ozanne, 2013).

Clarifying Self-prototypes in clinical settings. How patients perceive and label themselves has observable effects on measures taken in clinical practice. For example, blood pressure recordings taken from the same patients in clinical settings and in their natural environments using ambulatory recorders, that are hypertensive in the clinical setting but normotensive in everyday life is defined as "white coat" hypertension (Spruill et al., 2007)."White coat" hypertension is not a chronic disease with potential long-term health morbidity, but patients may incorrectly Self-label as hypertensive. Can prototypes of the Self be redefined by communications in clinical settings?

Howell and her colleagues conducted two, separate randomized clinical trial to reduce new mothers' postpartum depressive symptoms in an effort to reduce reporting of these symptoms postpartum (Howell et al., 2012). In the first trial, a total of 495 African-American and Hispanic patients, all new mothers, were randomized into treatment and control (enhanced usual care) conditions and interviewed at 3 weeks, and 3 and 6 months following delivery of the newborn. The primary question was whether an intervention clarifying expectations regarding the postpartum Self would reduce the experience of depressive symptoms. The intervention used simple graphical representation to describe the typical state of a new mother's body postpartum. For example, the pictorial representation of normal postpartum bleeding showed 10 small female figures, 8 red and 2 black, bypassing possible deficits in literacy and numeracy. Simple instructions to manage vaginal bleeding followed, along with clear expectations for outcomes; for example, by three months most mothers will stop having vaginal bleeding (8 black and 2 red figures). The intervention was successful in encouraging mothers to not use the prototype of the pre-pregnancy, normative self, to create the expectations for the postpartum self. By generating a biologically realistic representation of the postpartum self, patients expectations were more congruent with how they later felt and functioned, and the experience and reporting of postpartum depressive symptoms were reduced by roughly 40% at all three time points.

In the second, separate trial which recruited Caucasian and Asian mothers, the investigators identified a critical error in planning trials. Recommendations for designing clinical trials typically fail to provide sufficient guidance for investigators to anticipate when, why and how an intervention may appear to fail. One important factor is having an ongoing assessment of the targeted outcome independent of the trial itself. In this trial, it meant having an ongoing record of reporting of depressive symptoms post-partum by mothers drawn from the population at large; this is necessary to detect shifts in the targeted outcome (depressive symptoms) in the population unrelated to known factors. As CSM is Bayesian, it calls for an ongoing measure estimate of population parameters; that is for a measure of the level of reporting of depressive symptoms, the target, or the percent of new mothers meeting or exceeding criteria for the target in the months and days before and during the trial itself. Had this measure been in place, it would have pre-empted this trial as the intervention failed to show any effect because few Caucasian and Asian mothers reported depressive symptoms above the targeted cut point; only 6% of the mothers in both intervention and control groups exceeded criterion for post-partum depression at base-line, i.e., prior to intervention. The trial failed as the target was too low to change! The 6% frequency was 20% lower than expected based on prior longitudinal studies conducted in the same hospital with similar participants (Howell et al., 2014). Although the pre-trial estimate of the level of reporting of depressive symptoms postpartum was based on prior data (Howell, Mora, & Leventhal, 2006), the parameter had drifted downward for reasons unknown.

It is important to repeat that the post-partum trial was based on the assumption that postpartum expectations are based on a normative, pre-pregnancy prototype of the Self. As prototypes are averages of ongoing life experiences, they are historically remote in time and likely to represent a more robust and functional Self than the immediate, pre-pregnant Self. The expectations generated by these prototypes are likely therefore, to set unrealistic targets for self-evaluations of recovery. This is true for many conditions, e.g., rehabilitation following sports injury, as well as post-partum depression. Though prototypes can and do change, it is likely that prototypes of illnesses and treatments are typically far more malleable than the prototype of the Self. This variability is a challenge clinically and experimentally.

Action Planning and Habitual Performance

Although telling patients how to do something, i.e. giving them an action plan, is clearly effective in providing strategies for action, it is not the same as assisting them with learning the skills to generate plans (including contingency plans if recommended plans do not work in the patient's life) on one's own. Although a number of patients know how to initiate action such as filling a prescription and taking a prescribed medication, many fail to generalize their initial performance into lifelong action. CSM researchers have thus begun to explicate maintenance mechanisms and processes (strategies) for longer-term adherence to treatments.

Identifying conditions for habitual, long term adherence.

1) Quantitative studies. There is evidence that habit strength, or behavioral automaticity, is important for long term adherence to simple treatment routines. Phillips, Leventhal, and Leventhal (2013) found that among patients with hypertension who had been taking their medication for years, reports of "habit strength" for action (i.e., having a habit or routine for taking one's medication) was the only significant predictor of long-term adherence – compared to patients' treatment-related beliefs, barriers to adherence, and experiences that the treatment worked as expected. Bolman, Arwert, and Vollink (2011) similarly found that patients' habit strength for taking their prophylactic asthma medication predicted their adherence to that medication.

The importance of consistent, habitual routines for long term adherence was uncovered in a recent study of 306 low income patients with asthma; 68% were African American and Hispanic, and all were over 60 years of age (Brooks et al., 2015). The proportion of adherent patients in the sample was low; only 38.6% of the 306 participants reported strict adherence to daily medication for controlling asymptomatic, pulmonary inflammation. A small sub-set of participants, 16% of the sample, who combined medication use with existent habit patterns were 3.7 times more likely to be highly adherent than patients who did not integrate taking

medication with existent, daily, routines. An example of such a routine was "… putting the inhaler in the bathroom and using it when I get up in the morning"; 67% of the patients using this strategy were highly adherent. Although initiating and converting adherence into systematic habit is more common among educated, financially better-off patients, any patient using these strategies is highly adherent regardless of their position on one or more external, moderating factors. The strategies work! The question is how did they plan?

2) Qualitative studies. Focus groups of patients "expert" at self-management of their chronic conditions can provide insight not only to the strategies used for long term adherence, but to the strategies they used to discover and create habitual action. Unlike many qualitative studies that recruit patients struggling with adherence, Tannenbaum and colleagues followed the model set forth decades ago in studies of master chess players, by recruiting patients with diabetes who had achieved excellent control (Tanenbaum et al., 2015b). After reading each of a series of scenarios describing patients having problems adhering to diabetes medication and/or life styles, these "experts" were asked what they would recommend to the patient in trouble, and how they handled similar problems in their own lives. "Expert" patients described an array of strategies for generating routines that combined monitoring daily behavioral patterns and identifying those that provided "slots" for introducing and sustaining new behaviors essential for effective self-management. For example, participants agreed that one needed to: 1. Recognize the threat, it can be life threatening, but then put it aside; 2. Focus on action and find start points; "You just cannot be a bystander in this disease."; "Do you want to live or do you want to die?"; "You change your food in the super market, not when you sit down to eat!"; 3. Adopt a gradual approach to change, "take one day at a time", and allow the body time to adjust to new exercise routine; 4. Experiment and monitor to detect safe and risky foods: "tested a lot at first. Trying to test out my food"; 5. Seek assistance when things are confusing, e.g., "called nurse to discuss readings"; and 6. Create habits – from novel to routine: "testing became second nature, like tying my shoes", a morning routine, "Wash my face, brush my teeth, then test my blood."

The responses by these focus group participants suggest that consistent management is the outcome of planning and making use of strategies for organizing behavior. The strategies included identifying start points for initiating behavioral change (change food in the super-market, not when you sit down to eat), monitoring the performance and outcomes of specific actions to see if they met expectations, and making use of professional and lay resources. By monitoring, testing and continually updating the baseline/tonic levels of symptoms and behaviors, the system becomes coherent and automatic. The organizational process is initiated and sustained by the implicit awareness that one is managing a threat to health that is potentially disabling and lethal, and doing so for a lifetime.

The Future of Common Sense Modelling: Coherence and Automation

The history of the Common-Sense Model (CSM) reflects a constant interplay between data and theoretical concepts. Representing the mechanisms and processes underlying self-management of anticipated and current health threats requires a substantial degree of complexity including the elements active at specific moment in time, e.g., representations of self, illness, treatments, procedures for planning and action plans, and the prototypes, and strategies for action and changing action. Additional complexity arises from the multi-level nature of the concepts – the concrete, perceptual and behavioral referents for the abstract concepts or labels. Given the multi-level complexity of CSM, it is not surprising that the transition between initiating a health behavior and the maintenance of behavioral change requires more representations of illness and treatments and specific action plans (Phillips et al., 2013; Rothman, 2000). Investigators introduced measures of "habit", whether a specific self-regulatory action is habitual, to fill the gap and predict treatment adherence over the long term. A question that remains is, "How does the common-sense system represent the transition from initiating a behavior to making the behavior habitual?" A somewhat different way of posing the question is, "Do we need an additional measure of habit or can we represent the change in the existent CSM framework?"

An answer to the above question suggested by the qualitative data, is that a successful transition requires embedding the start points for action and the goal for action in a comprehensive action plan, and conceptualizing the processes involved in the transition; experimenting, testing response outcomes and seeking professional and family assistance when needed. The outcome is a coherent self-regulatory system in which the representations of illness, treatment and action plan share a common set of expectations regarding the procedures for controlling risk. In the language that might be used by a psychologically savvy participant in one of our focus groups: "My asthma is under control because I keep my inhaler in the bathroom and use it when I get up in the morning, sometimes after I brush my teeth though before I wash my face and sometimes after I wash. It's easy to do, and although I don't feel anything in particular when I use my inhaler, I can tell that I do not have as many attacks as I had before I started using it. My asthma is well controlled." In short, the system is fully integrated; the prototypes for treatment are those for the illness, and the action plan integrates these expectations into a daily, i.e., habitual performance. Although the system is largely automatic, the precise placement of the action, e.g., before or after washing one's face or just before leaving the bathroom, can vary just as the mice running mazes in Tolman's laboratory decades ago varied the pathway between start and goal, variability inconsistent with the concept of habit but not inconsistent with the formation of a representation or map of the context in which a varied array of behaviors could unfold (Moser & Moser, 2016).

Conceptual frameworks such as the Health Belief Model (from which the CSM was developed), the "theory" of planned behavior (Ajzen, 1991) and other models focused on beliefs, are tested using validated scales to predict outcomes in regression models of cross-sectional or longitudinal data sets. Many studies using the CSM share this approach to design and analysis. Using scales to predict outcomes does not however, uncover the dynamic nature of transitions from doing nothing to starting and from starting to consistent action. How these transitions occur requires experimentation using theoretically based interventions that present study participants with examples and/or suggestions for particular strategies for environmental monitoring, selecting start points, varied behavioral patterns for reaching goals, and different time-frames and criteria for evaluating post performance experience. The randomized trials to reduce post-partum depression are but one of many illustrating specific ways of impacting the transitional processes leading to both initiation and adherence for the longer term. By activating an alternative view of the postpartum Self, a view that is understandable but not necessarily in a new mother's memory bank, the intervention altered new mother's views of their current status and reduced reporting and presumably the experience of postpartum depressive symptoms. Investigators committed to the use of reliable and validated scales for assessment and prediction, may be unwilling to take on the additional challenges of the experiment. The challenges are many as the interventions are complex and detecting necessary and sufficient components requires an innovative approach to design, as seen in the evolving work in the addictions field (Baker et al., 2014). Reluctance to shift to experimental approaches may also reflect a pattern common to the history of science; complex causal models may be less good at predicting outcomes than descriptive approaches; it's easier to predict sunrise and sunset from a table of past history than from a dynamic model of the solar system. Modelling the dynamics of change, i.e., identifying the interplay among the variables involved in the transition process using non-traditional approaches to assessment, e.g., Go-Cameras, on site audio recording (Leventhal, McCarthy, Roman, & Leventhal, 2015), will advance and improve the science and benefit the health of populations.

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Gestión de enfermedades crónicas en la vida cotidiana: Modelo de sentido común

Resumen

El modelo de sentido común de autorregulación (MSC) tiene una historia de más de 50 años como marco teórico que explica los procesos por los cuales los individuales forman representaciones cognitivas, afectivas y conductuales de la amenaza para la salud. Este artículo resume las mayores componentes de los modelos de sentido común de individuales, las suposiciones fundamentales de MSC como la teoría del cambio conductual dinámico y las mayores pruebas empíricas que han desarrollado estos aspectos de MSC desde los comienzos. Además, discutimos los cambios en curso de la misma teoría, tanto como su uso en la práctica médica para ayudar a los pacientes a optimizar la autogestión de amenazas de salud crónicas. La última sección se enfoca en las direcciones futuras de la teoría y su aplicación.

Palabra claves: modelo de sentido común de autorregulación, representaciones de la enfermedad y el tratamiento, autogestión de enfermedades crónicas, teoría de la conducta de salud, adherencia al tratamiento

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